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DIVISION OF ENGINEERING SERVICES
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METHOD OF TEST FOR FILM STRIPPING

A. SCOPE

The film stripping test is used to measure the resistance of bituminous material to stripping from the rock particles and is generally used to evaluate the mineral aggregate, but may be used to judge the adhesive capacity of the bituminous material. Stone screenings for use in seal coats or open-graded mixes are usually subjected to this test. The test is applied to the aggregate fraction passing the 3/8 in. sieve and retained on the No.8 sieve.

B. REFERENCES

California Test 206 - Specific Gravity and Absorption of Coarse Aggregate

C. APPARATUS

A complete list of necessary equipment is included in each part of this test procedure. Detailed descriptions of some of these items are included below:

1. Screw cap glass jars, approximately 8 oz. capacity.
2. Safety holding device for removing jar caps (see Figures 1 and 2).
3. Fluorescent light box - Optional (See Figure 3).
4. Machine designed to rotate test jars at 43 ± 2 rpm (see Figures 4 and 5).
5. Oven(s) capable of maintaining temperatures of $140^{\circ}\text{F} \pm 5^{\circ}\text{F}$, $230 \pm 5^{\circ}\text{F}$, and $300 \pm 5^{\circ}\text{F}$.
6. Hot plate.
7. Thermometer: Surface thermometer, capable of measuring temperatures between 120°F and 300°F .
8. Thermometer: Metal or glass stemmed, capable of measuring temperatures between 32°F and 212°F .
9. Balance: A balance with adequate capacity, accurate to ± 0.1 g.
10. Graduated cylinder, approximately 250 mL capacity and accurate to ± 2 mL.
11. Metal mixing container, approximately 4 in. diameter by 1 in. deep.
12. Heat resistant gloves.
13. Small spatula or pointed trowel.

D. MATERIALS

Distilled or de-ionized water

E. TEST REFORD FORMS

Use Form TL-302, for recording test.

F. MIXING

1. When paving grades of asphalt are being used, proceed as follows:
 - a. Use the asphalt (grade and source) to be used on the project.
 - b. Place 60 ± 1 g of aggregate into the metal mixing container and heat in a 230°F oven for a minimum of 30 minutes.
 - c. Heat the asphalt to $300^{\circ}\text{F} \pm 5^{\circ}\text{F}$ (stir occasionally to avoid local overheating if a hot plate is used for heating).
 - d. Calculate the asphalt quantity to use as follows:
$$(2.65 / \text{Sp. Gr. Aggregate}^1) \times 3.6 = \text{g of asphalt}$$
 - e. Place the container of heated aggregate on a hot plate (200°F to 250°F), add the calculated amount of asphalt and mix until the aggregate is thoroughly coated.
 - f. After mixing, immediately remove the sample and container from the hot plate. Separate the particles of the sample of paving mixture by hand so that the particles are not larger than $3/8$ in. Let the sample cool to room temperature for 1 to 2 hours.
 - g. Place the sample and container in the oven at 140°F for 15 to 18 hours.
 - h. Remove the mix from the container. Place the sample in a glass jar².
 - i. Cool the sample to room temperature ($77^{\circ}\text{F} \pm 2^{\circ}\text{F}$).
 - j. Add 175 ± 5 mL of distilled or de-ionized water at room temperature ($77^{\circ}\text{F} \pm 2^{\circ}\text{F}$) to the sample.
 - k. Place the cap securely on the jar.
 - l. Proceed to test.
2. When emulsified asphalt is being used, proceed as follows:
 - a. Use the grade and type of emulsion to be used on the job.
 - b. Place 60 ± 1 g of aggregate into the metal mixing container and surface dampen this aggregate with distilled or de-ionized water.
 - c. Calculate the emulsion quantity to use as follows:

$$\text{Residue} = 3.6 \times (2.65 / \text{Sp. Gr. Aggregate}^1)$$

$$\text{Emulsion} = (\text{Residue} \times 100) / \% \text{ Residue in Emulsion}^3$$

- d. Add the calculated amount of emulsion and thoroughly mix, let stand for 2 to 3 minutes, re-stir, and then drain off excess emulsion.
- e. Immediately place the container and the mix in the oven at 140°F for 15 to 18 hours.
- f. Remove the mix from the container and place it in a glass jar².
- g. Cool the sample to room temperature (77°F ± 2°F).
- h. Add 175 mL distilled or de-ionized water to the sample.
- i. Place the cap securely on the jar.
- j. Proceed to test.

G. TEST PROCEDURE

1. Place the jar containing the sample in the testing apparatus (see Figures 4 and 5) and rotate the jar for 15 minutes.
2. Remove the jar from the testing apparatus.
3. Remove the jar cap.
4. By visual observation, estimate the percentage of aggregate stripped when the jar is viewed beneath fluorescent light (the optional light box may be used for this purpose). Estimate on the basis of total surface of the mass.

H. PRECAUTIONS

1. Thorough mixing to coat all particles with bitumen is essential for consistent results.
2. Maintain test temperature within the limits specified.
3. Use job emulsion when possible. All emulsions should be well stirred prior to use due to the possibility of settlement. Use within 30 days of sampling.
4. When latex emulsions are used, all mixing must be done at 140°F (balling will occur if mixed cold).
5. When rapid set emulsion is used, dry the sample after the emulsion is added, then treat as if paving asphalt is used.

¹ Determine the Specific Gravity by use of California Test 206

² Any test sample that shows evidence of drainage and thinness of film after the 15 to 18 hour curing period should be reheated slightly and re-mixed before placing it in the glass jar

³ Select % Residue in Emulsion from Tables 1 or 2 in Section 94 of the Standard Specifications

I. REPORTING OF RESULTS

Report results in terms of the percent of the total aggregate surface stripped.

J. SAFETY AND HEALTH

It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Prior to handling, testing or disposing of any materials, testers must be knowledgeable about safe laboratory practices, hazards and exposure, chemical procurement and storage, and personal protective apparel and equipment.

Caltrans Laboratory Safety Manual is available at:

http://www.dot.ca.gov/hq/esc/ctms/pdf/lab_safety_manual.pdf

End of Text
(California Test 302 contains 7 pages)



FIGURE 1

Figure 1 is for illustration purposes only.
Heat resistant gloves must be worn when removing caps from jars (see Section J)

SAFETY BOX (For removing jar caps)

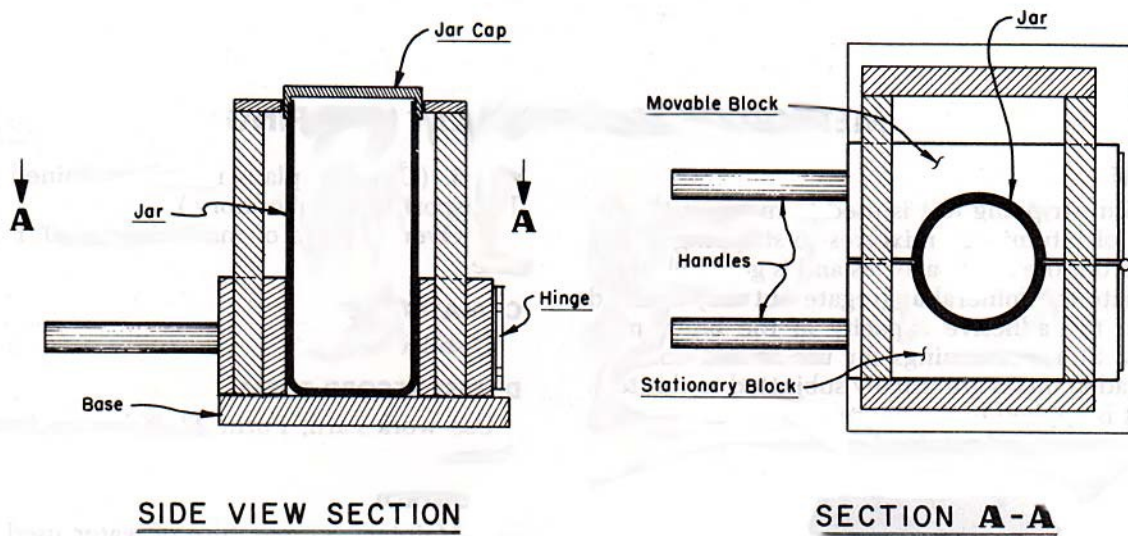


FIGURE 2

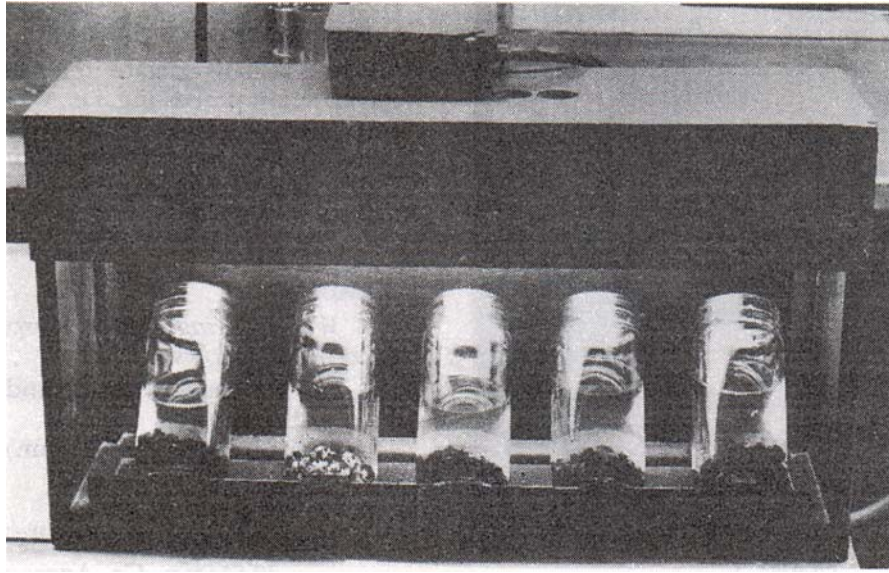


FIGURE 3

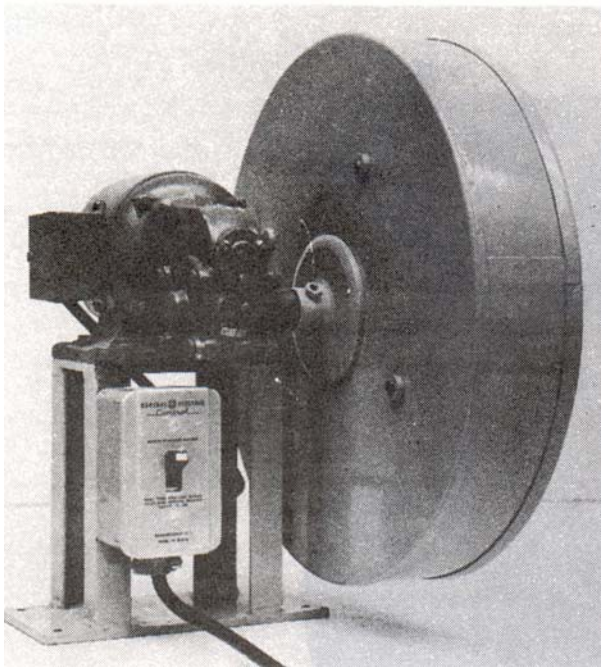


FIGURE 4

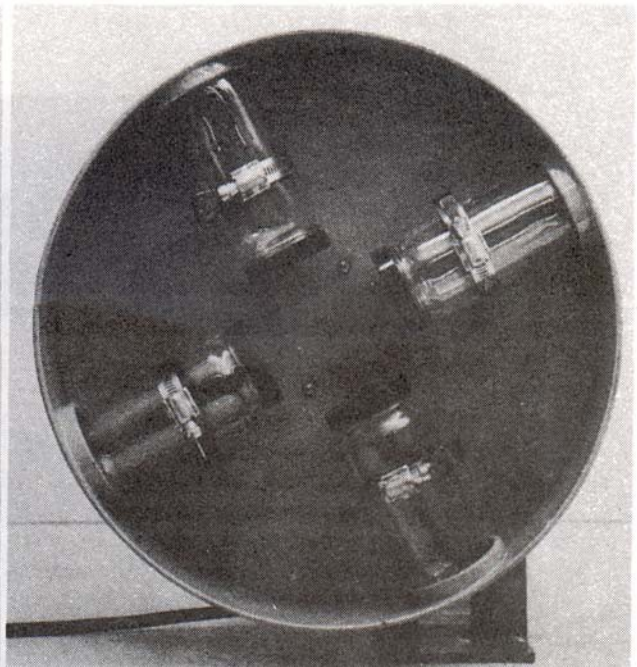


FIGURE 5



FIGURE 6